

CLAIMS

We claim:

1. A method for generating a mask database comprising:
  - forming an IC layer data file including data describing a repeating element, data describing a skeleton into which copies of the repeating element are to be placed, and instructions as to where repeating elements are to be placed;
  - modifying the IC layer data file to compensate for diffraction due to proximity of adjacent lines in the layer, thereby forming modified repeating elements, and modified data describing the skeleton;
  - generating a repeating element mask data file representing a central portion of the modified repeating elements; and
  - generating a skeleton mask data file representing the modified data describing the skeleton and data on edge portions of the modified repeating elements.
2. The method of Claim 1 further comprising generating a mask instruction file from the instructions as to where repeating elements are to be placed.
3. A method for generating a mask for an IC device layer comprising:
  - generating a layout for the layer;

performing an optical proximity correction for the layer to produce a mask layer database; identifying actual repeating elements in the layer; dividing the layer to form database repeating elements by making dividing lines within the actual repeating elements to exclude edge portions of the actual repeating elements; forming a mask layer database comprising:  
at least one database repeating element;  
a skeleton comprising data from the mask layer database not included in any of the at least one database repeating elements; and  
an instruction for inserting the at least one database repeating element into locations of the database repeating elements.

4. The method of Claim 3, wherein the step of dividing the layer to form database repeating elements by making dividing lines within the actual repeating elements to exclude edge portions of the actual repeating elements further comprises:

making dividing lines at edges of the actual repeating elements to form a set of ring elements that repeat when adjacent to identical structures.

5. A mask layer database comprising:.

a skeleton describing portions of the mask layer that are not repeating;  
at least one database repeating element; and

an instruction giving locations at which the at least one database repeating element is to be placed.

6. The mask layer database of Claim 5 wherein the number of database repeating elements is one.
7. The mask layer database of Claim 5 wherein the number of database repeating elements is two, one for describing a configurable logic block of an FPGA or an adjoining group of configurable logic blocks of an FPGA, and one for describing a block of RAM or group of adjoining blocks of RAM in the FPGA.
8. The mask layer database of Claim 5 wherein the number of database repeating elements is three, one for describing a configurable logic block of an FPGA or an adjoining group of configurable logic blocks of an FPGA, one for describing an input/output block of the FPGA, and one for describing a block of RAM or group of adjoining blocks of RAM in the FPGA.
9. The mask layer database of Claim 5 wherein the at least one database repeating element includes a central repeating element smaller than an actual repeating element and a set of ring repeating elements, each of which will be placed to surround one of the central repeating elements.
10. A method of preparing a database for making an IC device mask comprising the steps of:

at a design house, designing and laying out the IC device;  
storing a layout of the IC device in electronic form;  
sending the layout of the IC device in electronic form to an IC foundry;  
at the foundry, generating a layout in electronic form that is optically corrected from the layout of the IC device;  
at the design house, dividing the mask layout to identify a plurality of mask elements that are repeating and a skeleton of remaining elements, for the repeating mask elements creating a single database describing a repeating element and a set of instructions as to where to locate the repeating element;  
at a mask house, forming a mask from the skeleton and the single database describing a repeating element located in repeating locations as specified by the set of instructions.

11. The method of preparing a database for making an IC device mask as in Claim 10 wherein the mask includes lines having line widths that have been corrected for optical proximity to produce lines on an integrated circuit of a designed line width.